8/ Sub. spec. SMarley 4-18-01 (NE)

APPLICATION FOR UNITED STATES PATENT

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TITLE: REMOVABLE DATA RECORDING DEVICE CARTRIDGE AND RECEPTACLE THEREFOR

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OK to enter 4.26.01

SUBSTITUTE SPECIFICATION

Removable Data Recording Device Cartridge and Receptacle Therefor

[01] This application claims the priority of French Application No. 99-08306 filed June 7, 1999.

[02] BACKGROUND OF THE INVENTION

[03] Field of the Invention

[04] This invention relates to devices for data recording (and storage) in a severe environment. In a particular, but non-limiting example, it pertains to devices intended to equip airplanes; combat aircraft; ships; helicopters; combat vehicles, for example, armored vehicles; spacecraft; and similar equipment.

[05] This invention relates to the storage and recording of all types of data, for example, numerical, audio and especially video data, and includes types of data that may appear in the future.

[06] Background

[07] In this general context, storage and recording on magnetic tape is included, but, in a preferred embodiment, data storage and recording is in a "cartridge," that is to say, a hermetically sealed box, for example, a hard disk with its reading and recording device, comprising an "arm" in the conventional fashion.

[08] Hard disks, as used herein, include those that are currently available, especially disks with a format of 22" or 32", as usual, or any other hard disk or similar system that could appear in the future.

[09] As persons skilled in the art will understand, the invention also applies to any other data storage and recording support that is contained in a box that must be hermetically

sealed and that must be handled so as to be extracted from its housing after a given mission or operation and that must then be reinserted in that same housing for the next mission or operation.

[10] Also included within the scope of such devices are semiconductor memories and any other technology having an equivalent, current or future function.

[11] "Hermetic" means here the vacuum-tight elements, that is to say, those that have a zero or extremely low leakage rate in a vacuum environment or under very low ambient pressure.

[12] "Tight" means watertight or humidity-tight elements.

[13] In the above-mentioned environments, the equipment is typically subject to difficult or extreme conditions of vibration, vacuum (altitude) and/or shocks and similar constraints.

[14] The most difficult problem to be solved is the problem of altitude and, the more or less forceful pressure drop to which the equipment will be subjected.

[15] Pressure differences, when exerted on a non-hermetic device, will bring about incoming and outgoing flows of atmosphere in the box containing the data device and hence produce condensation phenomena. Moreover, in the case where the cartridge contains a hard disk, the arm will not remain at a predetermined distance from the disk, called the aerodynamic distance, but will risk being placed on the disk and scratching it, resulting in deteriorated recordings.

[16] It is thus necessary to resort to hermetically sealed boxes and boxes that are generally "suspended," that is to say, they are mounted on shock absorbers capable of

reducing the shocks and vibrations undergone in the severe environments to acceptable values.

[17] Data devices must also have a sufficient number of electrical contacts between the box (cartridge) and its support (receptacle) in the recorder to ensure the necessary transmissions of signals.

[18] For example, according to the currently customary data processing standards, one must have about 50 contacts for the IDE standard and 80 for the SCSI standard.

[19] However, recorders, especially those mounted in aircraft, must have as small dimensions as possible for obvious reasons of weight and bulk and, thus, the surface area available for contacts is reduced. This means that the contacts must themselves have small dimensions.

[20] Another requirement is that contacts must, without any harmful wear and tear, withstand a large number of "insertions," that is to say, connection/disconnection cycles, without displaying any wear and tear that would induce parasite resistances that would affect the data. Military-type connectors, such as the SUB-D or HILC 38999 type, can withstand 200 to 400 insertions. The chip card connectors must withstand about 5,000 insertions.

[21] It is also absolutely necessary that the cartridges be easily handled, that is to say, they must be easily extracted, transported and put back in place without any special precautions nor any special tools, even in a hostile or difficult environment. Thus, the boxes must be capable of being handled by technicians at airport runways, possibly with

hands wearing thick gloves, and they must withstand shocks, such as those that result from being dropped, and similar trauma encountered in routine use.

[22] The devices must therefore be compact, light, sturdy, hermetic, easily handled, and, obviously, reliable. They must present a large number of contacts on as small a surface as possibly and they must be capable of withstanding a large number of insertion cycles, for example, on the order of 3,000, without any damaging wear and tear. They must present an extraction and engagement mechanism that itself must be compact, simple, sturdy, reliable, and very precise, especially in terms of electrical contacts, that also must be easily handled, including with gloves. Insertion and extraction must not require any excessive force (entailing the risk of damaging the shock absorbers). The simple listing of these objectives underscores the difficulty of this undertaking because persons skilled in the art will understand that practically all of these criteria are antagonistic.

[23] There is no currently available connector capable of meeting all of these criteria. The only connectors that come close to some of these parameters are connectors for memory cards, but they are infinitely too fragile and absolutely unsuitable for the environments contemplated for the invention.

[24] Connectors called "hermetic lead-through" of the type shown in Figure 1, are currently known.

[25] BRIEF DESCRIPTION OF THE DRAWINGS

[26] Other features and advantages of the invention will appear more clearly upon reading the following description and referring to the attached drawing where:

[27] Figure 1 shows a "hermetic lead-through" contact of the prior art.

[28] Figure 2 shows three nonrestrictive examples of couples of plugs and studs forming the connection according to the invention.

[29] Figure 3 illustrates the process of engaging a cartridge in a receptacle.

[30] Figure 4 illustrates a way of mounting a stud in the wall of a cartridge 40 according to the invention.

[31] Figure 5 illustrates a way for locking the shock absorption of a receptacle in a box.

[32] Figure 6 illustrates method used in engaging the pin 120 in sleeve 105 according to the preferred embodiment of the invention.

[33] Figure 7 illustrates an engagement process according to the invention.

[34] On the attached figures, the same references have the same meanings, to wit:

[35] 1 female contact (prior art)

[36] 2 male contact or "plug" (prior art)

[37] 3 metallic support or "case" (prior art)

[38] 4 hermetic glass welding (prior art)

[39] 5 rear connection of contact, especially toward a printed circuit board not shown

[40] 10 elastic "plug"-type contact of the spring or piston type according to the invention

[41] 11 base of spring plug for mounting on printed circuit in nonrestrictive examples shown

[42] 12 contact of "stud" type according to the invention, intended to cooperate with elastic plug 10

[43] 16 variant of shape of stud 12 according to the invention

[44] 18 other variant of shape of stud 12 according to the invention

[45] 30 support or "receptacle" of cartridge, incorporating a connection plate 95, comprising plug contacts 10

[46] 40 cartridge (face bearing connection with "studs" 12 (or 16 or 18 or other variants within the immediate reach of persons skilled in the art)

[47] 45 connection rod for stud 12 (or 16 or 18 or other variants within the immediate reach of persons skilled in the art)

[48] 46 stud head

[49] 47 stud covering (generally a thin layer of gold)

[50] 60 stud protection layer (generally resin)

[51] 70 closing hood of box (opening according to arrow (1))

[52] 75 "prismatic" piece or cam integral with hood

[53] 80 rod or other control piece

[54] 85 mechanical safety unit (containing a return spring)

[55] 87 axis of rotation along arrows (2) and (3) when the hood is open

[56] (M) shock and vibration absorption movements of receptacle 30 (only movements perpendicular to the faces of the receptacle are considered here)

[57] 90 retractable chock:

[58] hood of box 70 closed: chock in high position permitting movements (M) of receptacle 30; hood open: chock in low position blocking movements (M));

[59] 100 engaging clip of cartridge 40

[60] 105 groove for fitting or clipping protuberance 120, preferably semi-cylindrical

[61] 110 piece for engagement of receptacle 40 of cartridge and support of protuberance 120, which is a cylindrical pin in preferred embodiment of the invention

[62] 120 protuberance intended to cooperate with groove 105, which protuberance is a cylindrical pin in a preferred embodiment of the invention

[63] 140 "U"-shaped piece, support of protuberance 120, which protuberance is a cylindrical pin in a preferred embodiment of the invention, the "U"-shaped piece 140 being adapted to receive clip 100 and cooperate with it and especially with groove 105

[64] 200 box

[65] 300 shock absorber of receptacle (generally a three-dimensional shock absorber)

[66] SUMMARY OF THE INVENTION

[67] In the prior art, illustrated in Figure 1, to make a single contact, it is necessary to provide a plug 2, cooperating with a female contact 1 (or inversely), the female member having to guide the plug. The assembly is maintained in a support or "case" 3 by means of a hermetic joint 4 formed by a glass welding, that is to say, a hermetic joint obtained by heating the assembly in the known fashion to about 600-700°C until the glass forms a semi-liquid phase, bringing about a tight vacuum ("hermetic") connection upon cooling. The plug 2 and the female contact 1 each are connected to a standard connection device such

as a printed circuit or similar device, for example, at 5. The plugs have a screwing button that applies a strong insertion or extraction force on the contacts along the longitudinal axis of the connection. Such a force is not compatible with the requirements of the invention according to which the necessary connection force must be weak to facilitate handling and, above all, not to damage the shock absorption systems. In the devices shown by this invention, the masses, suspended by the shock absorption means, are light and consequently the shock absorbers are flexible; an excessively strong force would damage them irreparably and the device could no longer be suitably suspended, with serious consequences as regards the reliability of measures and the system. Such known devices, furthermore, have very large dimensions with diameters on the order of a 3 to 5 cm housing with about 40 contacts. Furthermore, they do not make it possible to mechanically lock the cartridge. For these various reasons, their so-called "insertion" technology is not suitable.

[68] The invention proposes a solution that is not an insertion but rather a "contact" in spite of the contradictory requirements mentioned above.

[69] Generally speaking, the invention relates to a process for making a connection between a cartridge 40, that includes a data recording and storage means, and a receptacle 30, characterized in that the connection is made by contact and not by insertion and that the contact is made for each electrical contact by the cooperation of a plug 10 mounted elastically by a means 11 on receptacle 30 and a stud 12, 16 or 18 mounted on cartridge 40.

[70] The advantage inherent in the contact technology is that it eliminates the constraint represented by precision axial guidance that is required in case of insertion as in Figure 1.

[71] The solution is not obvious because it was also recalled that the problem posed here, among other things, was to provide a light and compact system not requiring a strong cartridge insertion or extraction force and easily handled with gloved hands or the like.

[72] According to the invention, we propose quite generally a data storage or recording device for a severe environment that can possibly be mounted on land vehicles or on ships or aircraft or space vehicles of any type the device of the invention includes a recording cartridge (with hard disk or other data support) and a receptacle (or cartridge support) that is "suspended" (that is to say, it is kept in position by preferably multidirectional shock absorbers), characterized in that the connection between the cartridge and its receptacle is made by contact and not by insertion and that the contact for each electrical contact is made by the cooperation of a plug mounted elastically on the receptacle and a stud mounted on the cartridge in a hermetic manner.

[73] DETAILED DESCRIPTION OF THE INVENTION

[74] The invention is a data storage or recording device for use in a severe environment that can be mounted on land vehicles or on ships or aircraft or space vehicles of any type. The device includes a recording cartridge 40 (with hard disk or other data support) and a receptacle (or cartridge support) 30 that is "suspended" (that is to say, it is kept in position by preferably multidirectional shock absorbers). The connection between the cartridge and its receptacle is made by contact and not by insertion and the contact for each electrical contact is made by the cooperation of a plug 10, mounted elastically with means 11 (such as a spring or on the a piston receptacle), and a stud 12, 16 or 18 mounted on the cartridge 40 in a hermetic manner.

[75] The invention provides a solution that accommodates all of the required parameters of a data storage or recording device for a severe environment that can be mounted on a land vehicle or a ship or an aircraft or a space vehicle, where the device is of the kind that includes a recording cartridge 40 (with hard disk or other data support) and a receptacle (or cartridge support) 30 that is "suspended" (that is to say, it is kept in position by preferably multidirectional shock absorbers). The device is characterized in that:

[76] the connection between recording cartridge 40 and suspended receptacle 30 is made by as many couples of plug 10/stud 12 or 16 or 18 as there are required contacts;

[77] the plugs 10 go through the wall of receptacle 30 and present a protuberant portion with a spherical, rounded or similar shape;

[78] the plugs 10 are mounted by a shock absorption and return means 11;

[79] the studs 12 or 16 or 18 go through the wall of the cartridge 40 and present a slightly protuberant part with a concave shape 12, with a plan or shape 16 or with a slightly convex shape 18;

[80] the plugs 10 and the studs 12 or 16 or 18 are geometrically adapted in terms of shape and dimension to cooperate and create an effective electrical contact when one makes receptacle 30 and cartridge 40 face each other;

[81] the cartridge 40 and the receptacle 30 include an engagement means capable of positioning all such plugs 10 and studs 12, 16, 18 opposite each other so as to make an effective electrical contact and to ensure the mechanical hold of cartridge 40.

[82] Persons skilled in the art will understand that the shape of the plugs and the studs is not restrictive here and is given only way of illustration. Preferred plugs have a head

with a generally spherical or rounded shape at the top 46. Studs having a head that is slightly concave 12 are preferred; studs may also have a flat head 16 or a slightly convex head 18.

[83] Generally speaking, persons skilled in the art will know how to visualize -- if necessary, by means of routine tests -- the adapted shapes to create an effective electrical contact by means of contact.

[84] As used herein, the terms "plug" and "studs" are intended to designate all of these shapes either described here or accessible to persons skilled in the art.

[85] As shown in Figure 2 and Figure 5, the plugs (and, respectively, the studs) will preferably be positioned in a plate 95 of the receptacle 30 (or, respectively, of the contact face of the cartridge 40). One could provide other devices that have, for example, several zones of studs and plugs opposite each other, and these and similar arrangements are within the knowledge of persons skilled in the art.

[86] Figure 4 shows a preferred manner of assembling the plugs in the wall or contact face of the cartridge 40.

[87] Accordingly, the invention also relates to a process for mounting the studs according to which stud 12 (or 16 or 18) is positioned by its rod 45 in an adaptive opening in a wall of the receptacle 40 by means of a glass welding 4 after which a mold of protective material 60,such as a resin, is deposited around the head 46.

[88] The stud will preferably be made of metal or an alloy with a very high electric conductivity and it will preferably comprise a fine gold coating 47 or a coating of an equivalent metal or alloy promoting electrical contact between the plug and the stud.

[89] As noted earlier, the cartridge 40 is intended to be removed from its support or receptacle 30, for example, upon return from a mission, so that its contents may be processed. The cartridge 40 must then be capable of being repositioned in the its receptacle 30 for the next mission, with as perfect an electrical contact as possible.

[90] The solution to the problems in the prior art is not evident because it is advisable perfectly to position the connection arrangement whose contact surface is very small for each plug/stud couple.

[91] The invention works via engagement/disengagement, performing a complex movement described below.

[92] Figure 3 and Figure 7 illustrate examples of processes for engaging the cartridge in the receptacle.

[93] Figure 3a (and Figure 7a), show the position of the cartridge 40 and receptacle 30 (or cartridge support), just prior to engagement. One can see that cartridge 40 has, integral with its lower portion, at least one and preferably at least two clips 100 having a groove 105. The clips 100 are capable of cooperating by tight fitting with a protuberant part 120 that is integral with an engagement piece 110, 140 in the shape of a "U," which is itself integral with the receptacle 30. Cooperation between the receptacle 30 and cartridge 40 is governed by mechanical means such as the engagement movement of the clip, or clips 100 in the "U" shaped engagement piece 110, 140, leading to "pre-engagement", by a slightly exaggerated descent of the clip of the cartridge with respect to protuberance 120 followed by "final engagement" through the fact that said clip is raised again to lead to a tight fit of the groove 105 and the protuberance 120.

[94] The engagement process involves assisting the engaging action by making the clip or clips 100 slide (movement "A," Figure 3a) in the "U" opening of engagement piece 110, 140, seeing to it that groove 105 will descend slightly further down that the corresponding protuberance 120 (Figures 3a and 7a) after which one ends the engaging action by putting the contact face of cartridge 40 on the contact face of receptacle 30 (movement "B," Figure 3b,) and by allowing the two faces to be positioned via a slight rise (movement "C," Figure 3b) and by tight fitting of groove 105 with protuberance 120 at the end of this rising motion.

[95] According to the preferred embodiment of the invention, protuberance 120 is a cylindrical pin and corresponding groove 105 is a semi-cylindrical groove so adapted as to receive the pin 120 with a tight fit. With the help of this term, persons skilled in the art will understand that there is no leeway after engagement.

[96] Figure 6 illustrates a method of engaging the pin in the groove.

[97] During the above-described engagement action, cylindrical pin 120 initially rests on the edge of groove 105. (Figure 6a) The compression effort that is applied when the cartridge compresses the plugs causes the pin 120 to roll into the center of the groove 105. (Figure 6b).

[98] According to this process, one understands that the slight rise of the cartridge during final engagement, which represents an extremely small distance of about 0.2 to 0.5 mm while each stud comes into contact with each plug, will be expressed by a perfect self-cleaning of the contact surfaces. During this movement, there is no wear and tear that one might fear and that would be damaging; tests showed, on the other hand, that the effective

service life of contacts thus self-cleaned was definitely longer than the effective service life of the cartridge.

[99] As also indicated above, it is important that the operator not be forced during the placement of cartridge 40 to apply excessive forces on receptacle 30 that could damage the shock absorbers.

[100] We know that the device made up of the receptacle 30 and the cartridge 40, as well as by various other known elements, are generally contained in a resistant and tight box. Figure 5 shows the positioning of a receptacle 30 in a box 200. One gets at the cartridge, housed in its receptacle, by opening a hood 70.

[101] The invention proposes the device include a mechanical means for the temporary automatic locking of the spring-back shift (M) of receptacle 30 to protect the shock absorbers 300 during the extraction phase and the phase in which the cartridge is put back in the receptacle.

[102] With reference to Figure 5, a preferred solution for use in the invention is a device that includes a mechanical means for the temporary automatic locking of the shift (M) of receptacle 30 when one opens a hood 70 of the box 200 to gain access to the cartridge, and the same means again permits the normal spring-back shift (M) of receptacle 30 during the closing of the hood to, that is to say, after one has put a cartridge back in place by means of engagement on the receptacle.

[103] The importance of locking the shift is that one protects the shock absorbers 300 since they -- regardless of the force that is exerted -- are no longer stressed along direction (M).

[104] Figure 5 shows a particular nonrestrictive means for temporary locking, characterized in that it includes a prismatic piece or a cam 75 having an inclined face that is integral with the hood 70 and a retractable chock 90 that is integral with a piece 85 constituting the mechanical safety unit considered. The piece is integral with a control rod 80 or a similar piece capable of cooperating with the cam 75 via contact by sliding on the inclined surface of the cam or prism. The entire piece forming the chock is mounted in a rotating manner around the longitudinal axis 87 of unit 85. The unit 85 includes a return means such as a spring or a similar device, tending to lower the chock 90 behind the contact face of receptacle 30 and the various geometries, shapes and positioning of the various pieces are adapted so that the opening of the hood 70 (and thus of cam 75) according to movement (1) by sliding would release control rod 80, which then moves due to the action of the return means, not shown, according to movement (2) to which corresponds movement (3) of chock 90, a movement that positions the chock 90 behind the receptacle 30. The thickness and positioning of chock 90 are adapted so that in this position the shock absorption (or spring release shift) movement (M) of the receptacle will be impossible.

[105] One can then return the cartridge in place without the receptacle contacting the shock absorbers 300 according to movement (M), since that movement is prevented by chock 90 and there is therefore no risk of deforming the shock absorbers 300.

[106] When one closes the hood again, the inverse movement raises chock 90, which is then positioned above the receptacle, thus again permitting shock absorption movement (M).

[107] According to a nonrestrictive embodiment of the invention, the return force for plugs 10 is on the order of 1 N for each plug.

[108] According to a preferred but nonrestrictive embodiment, the shock absorption or return means 11 for plug 10 is a spring or a piston, preferably a small piston.

[109] The system described in Figure 5 can also be used as a detector for the opening of the hood 70. It is necessary that the cartridge no longer be connected to the power supply when one extracts it. For example, when the cartridge, comprises a disk and an arm, the arm could stop and rest on the disk; one can easily understand that the further movements imparted to the cartridge during its transport will be transmitted to the arm, which will damage the disk and the recorded data. On the other hand, if the power supply to the cartridge is cut off prior to extraction, the arm is automatically placed in the so-called "parking" position where it cannot damage the disk.

[110] The system in Figure 5, according to a particular embodiment, comprises a means adapted for automatically cutting the electric power supply to the cartridge when hood 70 is opened.

[111] Such a means, may be for example, an opening detection contact of the known type, mounted partly on the hood and partly on the portion of the box containing cartridge receptacle 30.

[112] Persons skilled in the art will know how to visualize other equivalent means.

[113] The invention also relates to applications of devices and processes described for recording and storage of data on the ground or mounted on a land vehicle or a ship or an aircraft or a space vehicle of any type.

What is claimed is:

1. Device for making a connection in a "hermetic" environment between a cartridge 40 comprising a data recording and storage means and its receptacle 30 in a data storage or recording device for a severe environment, possibly being mounted on a land vehicle or a ship or an aircraft or a space vehicle of any type, characterized in that the connection is made by contact and not by insertion and that the contact is accomplished for each electrical contact by cooperation between a plug 10 mounted elastically by a means 11 on receptacle 30 and a stud 12, 16 or 18 mounted in a hermetic fashion on cartridge 40.

2. Process according to Claim 1, characterized in that the studs are so mounted that stud 12 (or 16 or 18) is positioned by its rod 45 in an opening made in wall 40 by means of a known glass welding 4 after which one deposits around head 46 a mold of protective material 60 such as a resin.

3. Process according to Claim 1 or 2, characterized in that one makes the contact or the disconnect by engagement/disengagement of cartridge 40 and receptacle 30.

4. Process according to any of Claims 1 to 3, characterized in that the engagement process involves cushioning the engagement act by making clip or clips 100 slide (movement "A") in the "U"-shaped opening of engagement piece 110, 140, seeing to it that groove 105 will descend slightly lower than the corresponding protuberance 120 after which one terminates the engagement action by placing the contact face of cartridge 40 on the contact face of receptacle 30, movement "B," Figure 3b, and by positioning the two faces via a slight rise (movement "C") and by tight fitting of groove 105 with protuberance 120 at the end of this rising motion.

5. Process according to Claim 4, characterized in that during the engagement action, the cylindrical pin 120 rests on the edge of groove 105 and the compression effort that is applied when the cartridge compresses the plugs causes the pin to roll in the center of the groove.

6. Process according to Claim 5 or 6, characterized in that engagement results in a perfect self-cleaning of the contact surfaces between the plug and the stud.

7. Data storage or recording device for a severe environment that can possibly be mounted on a land vehicle or a ship or an aircraft or a space vehicle of any type of the kind comprising a recording cartridge 40 (with hard disk or other data support) and a receptacle (or cartridge support) 30 that is "suspended" (that is to say, it is kept in position by preferably multidirectional shock absorbers), characterized in that the connection between the cartridge and its receptacle is made by contact and not by insertion and that the contact for each electrical contact is made by the cooperation of a plug 10 mounted elastically by means 11 on receptacle 30 and a stud 12, 16 or 18 mounted on cartridge 40 in a hermetic manner.

8. Data storage or recording device for a severe environment that can possibly be mounted on a land vehicle or a ship or an aircraft or a space vehicle of any type of the kind comprising a recording cartridge 40 (with hard disk or other data support) and a receptacle (or cartridge support) 30 that is "suspended" (that is to say, it is kept in position by preferably multidirectional shock absorbers), characterized in that:

- the connection between recording cartridge 40 and suspended receptacle 30 is made by as many couples of "plug 10"/"stud 12 or 16 or 18" as there are required contacts;

said plugs 10 go through the wall of receptacle 30 and present a protuberant portion with a spherical or rounded or similar shape;

and they are mounted on an shock absorption and return means 11

and said studs 12 or 16 or 18 go through the wall of the cartridge box 40 and present a slightly protuberant part with a concave shape 12, with a plane shape 16 or a slightly convex shape 18;

said plugs 10 and said studs 12, 16 or 18 are geometrically adapted in terms of shape and dimension to cooperate and create an effective electrical contact when one makes receptacle 30 and cartridge 40 face each other;

- cartridge 40 and receptacle 30 comprise engagement means capable of positioning plugs 10 and studs 12, 16, 18 opposite each other so as to make an effective electrical contact and to ensure the mechanical hold of cartridge 40.

9. Device according to Claim 7 or 8, characterized in that plugs 10 have a head with a generally spherical or rounded shape at the top.

10. Device according to any of Claims 7 to 9, characterized in that the studs have a head 46 that is slightly concave (12), or in a more preferred manner a head (16), or in an even less preferred manner slightly convex (18).

11. Device according to any of Claims 7 to 10, characterized in that the cushioning or return means 11 is a spring or a piston, preferably a piston.

12. Device according to any of Claims 7 to 11, characterized in that the plugs (and, respectively, the studs) will preferably be positioned in a plate 95 of receptacle 30 (or, respectively, of the contact face of cartridge 40).

13. Device according to any of Claims 7 to 11, characterized in that one could provide several zones of corresponding plugs and studs 75 opposite each other.

14. Device according to any of Claims 7 to 13, characterized in that the studs are so mounted that stud 12 (or 16 or 18) is positioned by its rod 45 in an opening made in wall 40 by means of a known glass welding 4 after which one deposits around head 46 a mold of protective material 60 such as a resin.

15. Device according to any of Claims 7 to 14, characterized in that the stud will preferably be made of metal or a highly electricity-conducting alloy and will preferably comprise a fine gold coating 47 or a coating of a metal or equivalent alloy promoting electrical contact between plug and stud.

16. Device according to any of Claims 7 to 15, characterized in that cartridge 40 is integral in its lower part by at least one and preferably two (possibly more) clips 100 comprising a groove 105 capable of cooperating by tight fitting with a protuberant part 120 that is integral with an engagement piece 110, 140 in the shape of a "U," which itself is integral with receptacle 30, cooperation being governed by mechanical means such as the engagement movement of the clip or clips in the "U" leading to "pre-engagement" by a slightly exaggerated descent of the clip of the cartridge with respect to protuberance 120

followed by "final engagement" through the fact that said clip is raised again to lead to a tight fit of groove 105 and protuberance 120.

17. Device according to Claim 16, characterized in that protuberance 120 is a cylindrical pin and corresponding groove 105 is a semi-cylindrical groove so adapted as to receive pin 120 in a tight fitting.

18. Device according to Claim 16 or 17, characterized in that during the engagement action, the cylindrical pin 120 rests on the edge of groove 105 and the compression effort that is applied when the cartridge compresses the plugs causes the pin to roll in the center of the groove.

19. Device according to any of Claims 16 to 18, characterized in that the engagement action performs a self-cleaning of the contact surfaces between plug and stud.

20. Device according to any of Claims 7 to 19, characterized in that it comprises a mechanical means for the temporary automatic locking of the [spring-back] shift (M) of receptacle 30 to protect the shock absorbers during the extraction phase and the phase in which the cartridge is put back in its receptacle.

21. Device according to Claim 20, characterized in that it comprises a mechanical means for the temporary automatic locking of [spring-back] shift (M) of receptacle 30 to protect the shock absorbers when one opens hood 70 of the box to get at the cartridge, the same means again permitting normal shifting (M) of receptacle 30 during the closing of the hood, that is to say, when one puts a cartridge back in place through engagement on the receptacle.

22. Device according to Claim 20 or 21, characterized in that said temporary locking means comprises a piece in the shape of a prism or cam 75 comprising an inclined face that is integral with hood 70 and a retractable chock 90 that is integral with a piece 85 constituting the mechanical safety unit considered, said piece itself being integral with a control rod 80 or a similar piece capable of cooperating with cam 75 via contact sliding on the inclined surface of said cam or prism, the entire piece forming the chock being mounted in a rotating manner around the longitudinal axis 87 of unit 85, and this assembly comprises a return means such as a spring or a similar device, tending to lower the chock 90 behind the contact face of receptacle 30 and the various geometries, shapes and positioning of the various pieces are adapted so that the opening of hood 70 (and thus of cam 75) according to movement (1) by sliding would release control rod 80, which then moves due to the action of the return means according to movement (2) to which corresponds movement (3) of chock 90, a movement that positions said chock 90 behind receptacle 30, the thickness and positioning of chock 90 being so adapted that in this position the shock absorption (or spring release shift) movement (M) of the receptacle will be impossible.

23. Device according to any of Claims 20 to 22, characterized in that when one recloses the hood, the inverse movement raises chock 90, which is then positioned above the receptacle, thus again permitting the cushioning movement (M).

24. Device according to any of Claims 7 to 23, characterized in that the return force for plugs 10 by the return means of the piston type or the spring type is on the order of 1 N for each plug.

25. Device according to any of Claims 20 to 24, characterized in that it comprises a means provided for automatically cutting the electrical power supply to the cartridge when hood 70 is open.

26. Device according to Claim 25, characterized in that said means will be an opening detection contact mounted partly on the hood and partly on the portion of the box that contains cartridge receptacle 30.

27. Applications of devices and procedures according to any of Claims 1 to 25 for data recording and storage on the ground or mounted on a land vehicle or a ship or an aircraft or a space vehicle of any type.

ABSTRACT

The invention is data recording (and storage) device for use in a severe environment. A connection is made between a cartridge 40 comprising a data recording and storage means on its receptacle 30 by contact and not by insertion, and the contact is made for each electrical contact by the cooperation of a plug 10, mounted elastically by a means 11 on receptacle 30 and a stud 12, 16 or 18 mounted on cartridge 40. The invention also comprises a process for cartridge-receptacle engagement which ensures self-cleaning of contacts. The device is intended for use on airliners, combat aircraft, ships, helicopters, combat vehicles such as, for example, armored vehicles, spacecraft and similar equipment.